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PRESERVICE PRIMARY SCHOOL TEACHERS' SENTIMENTS, ATTITUDES AND CONCERNS ABOUT INCLUSIVE EDUCATION: DIFFERENTIATED SCIENCE EXPERIMENTS

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Abstract:
Recently, students with special needs draw attention by the regulations and amendments made by the Turkey Ministry of National Education regarding the inclusive education, as well as by the new courses added to all branches in the new teacher training programs started by the Turkish Council of Higher Education in 2018. These changes and innovations provide the possibility that the use of differentiated activities in science courses as an example of instructional adaptations in science teacher training will make a contribution to inclusive education. The aim of this study is to investigate the effects of differentiated science activities on pre-service primary teachers' sentiments, attitudes and concerns about inclusive education. The randomized pretest-posttest control group design was used in the research. The study group of the research consisted of 103 second grade pre-service primary teachers who attended the Science Laboratory Applications course. The Sentiments, Attitudes and Concerns Scale about Inclusive Education was used as a data collection tool. A paired-sample t-test was used for data analysis. As a result of the study, it is concluded that differentiated science experiments positively affected pre-service primary teachers' sentiments, attitudes and concerns about inclusive education.

Keywords: attitudes, concerns, differentiated experiments, inclusive education, science education, sentiments

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1. Introduction

Nowadays, the increase in the number of students with special needs has made it necessary to address individual differences and to organize educational and teaching environments according to students' needs. Therefore, it is important to differentiate not only the curriculum but also the teaching practices, activities and materials of the instructor in accordance with the individual differences of the students.

It is stated that students with special needs have lower performance in science course than their peers (Sarı & Pürsün, 2016). Moreover, the fact that the science course contains too many abstract and technical concepts causes difficulties in understanding the concepts of science and ensuring permanence. This fact requires applying special strategies, methods and techniques to prevent the difficulties that students with special needs experienced in science class. Besides, proper adaptations and differentiations should be made in science teaching. It can be said that individualization, which is the main purpose of special education, is an example of differentiation (Özgüç, 2017; Karaer, 2017). For this reason, it is very important to have science activities in individualized education programs (Kartal, 2017). One of the main objectives of science courses is to improve students' science literacy while at the same time giving them more mental and manual skills (Çepni, 2005).

The vision of the Turkey National Science Education Curriculum says that all students, regardless of their individual differences, should improve science and technology literacy through the education (Ministry of National Education [MoNE], 2005). Programs which take individual diversities into consideration are an effective step for students towards acquiring science literacy and gaining social skills. At this point, the teachers are expected to realize these diversities and to create a lesson plan considering them. In doing so, teachers can take on the role of mediation for children in developing social interaction and enhancing behavioral skills (Avcı, 1988; Walker & Lamon, 1987). Students with special needs attending primary schools may face many problems in their learning processes.

In order to meet the needs of special students and to educate them at their own pace without causing them to miss their peers in classroom setting, one of the most important issues is to adjust instructional adaptations. Instructional adaptations can be defined as changes in different dimensions of teaching (in terms of content, materials, activities, etc.) in order to enable students to learn at their own pace in the same teaching environment together with their peers. In order to enable students to acquire targeted knowledge and skills, teachers have to make adjustments not only in materials and classroom environment, but also in teaching methods.

The teacher's adaptation of the teaching methods requires using different teaching methods according to the needs of the students and to the characteristics of the subject to be taught, as well as to decide which teaching method will be more effective for which subjects (Uslu & Çoruhlu, 2012).

2. Differentiated Instruction

Differentiated instruction is an approach developed to diversify teaching according to student characteristics. Many approaches such as social constructivism, brain-based learning, learning styles and multiple intelligences stand for the basis of differentiated instruction. Differentiated instruction provides diverse ways of learning for the children with diverse learning styles, multiple intelligence areas, interest areas and socio-cultural characteristics. In this way, all students in the class learn the same subject in the appropriate learning ways special to them. In addition, students' learning abilities and attitudes and motivation towards the course improve (Avcı & Yüksel, 2014). The nature of differentiated instruction is to look at different learning environments and content differently depending on the teacher, student and curriculum. An effective instance of differentiated instruction involves knowing the student well, understanding the curriculum, providing many ways of learning, sharing responsibilities with the students and adopting a flexible and reflective approach. Teachers can differentiate some of the program elements (content, process, product) based on one or more of the student characteristics (readiness, interest, learning profile) at any time during the course or unit process (Demiral, 2015).

In general, differentiation is the process of adjusting instruction to respond to the learning needs of each individual. Each student is different, learns in different ways and the creation of different learning environments and different teaching and learning strategies for these learning environments will serve the principle of differentiation (Ekiz, 2001). Considering that students have different needs in terms of learning, effective teaching should be provided to meet their needs (Demiral, 2015; Ekiz, 2001). The most important factor in achieving good learning in science classes is adjusting the differentiation of instruction and learning accordingly. The instruction can be started by determining the prerequisite knowledge of the students about any subject or concept. This practice leads teachers to differentiate students and create a suitable learning environment for each of them. Differentiation is an important feature of effective learning and teaching. It includes the following elements:

- To be based on the capacities of the students;
- Self-study of the students;
- Provide students with alternative learning activities;
- Use various teaching methods while instructing on a subject;
- Provide opportunities for students to work with groups;
- Students to take responsibility for their own learning;
- Different expectations from students on the same subject.

The goal here is to reveal what each individual has learned, understood and can do (Ekiz, 2001).

Teachers have the biggest role in differentiating the instruction. Getting to know the students, planning the instruction suited to student qualifications, conducting teaching-learning processes and evaluating student development are among the main

tasks of the teacher (Demirkaya, 2018). A teacher who aims at the development of all students in the classroom should apply the appropriate adjustments/adaptations according to the needs of the students. The main purpose of the adjustments applied to the classroom is to ensure the highest level of participation of the students to the activities. Accordingly, adjustment in teaching is the process of making various arrangements/changes in order for students with different educational needs from their peers to learn at their own pace and to participate in the activities carried out in the classroom (Kargın, 2017).

3. Sentiments, Attitudes and Concerns about Inclusive Education

An attitude is a disposition attributed to an individual and forming his/her thoughts, feelings and behaviors on a regular basis. Therefore, the attitudes of the individual may not be reflected in their behavior. There are three basic elements of attitude, as: a)affective, b)cognitive, c)behavioral. An attitude which has these three elements is called as a strong attitude. Having related in medium level, these elements are separate from each other. For example, suppose that some individuals exhibit negative attitudes towards the ones with disabilities. The emotional element of this attitude may be that they are afraid of people with disabilities, and the cognitive element may be that they believe that the individuals with disabilities will harm them. The quality of the services that individuals with disabilities will receive depends on the attitudes of individuals who directly or indirectly interact with them (Ardıç, 2016).

It is ensured by the legal regulations in Turkey that education and training services of individuals with special needs are provided among their peers who have no special needs, according to the Decree No 573 which entered into force in 1997, special education services regulation in 2000, and the Article 42 of the Constitution which says that no individual shall be deprived of the right to education and training. In addition, Article 26 of the Universal Declaration of Human Rights states that "*Everyone has the right to education*" and emphasizes the necessity of education for all individuals. In order to ensure the inclusion and integration of the individuals with special needs, which have an important place in the society, their educational needs must be met by considering their individual differences. Despite these legal regulations, inclusion practices have not yet reached the desired level (Canöz, 2010; Cavkaytar 2017; Diken & Sucuoğlu, 1999; Orel, Zerey & Töret, 2004).

Classes in Turkey are now the inclusion classes. Since 2009, there are approximately 200,000 classrooms in Turkey with inclusion students. Soon there will be no classrooms without inclusion students. In this case, classroom management should be considered by taking these children into consideration (Bacanlı & Aydın, 2017). Inclusion is based on the philosophy that all pupils are different in any way (but not limited to disability), and schools need to adapt and change their practices to meet their learning needs (Kinsella & Senior, 2008).

In the last two decades, the inclusion movement has come to the forefront. Full inclusion is that all students receive education in general classes regardless of the level and type of their disability (Altun, 2016). In order to become a good inclusion and differentiated classroom teacher, first of all you need to be an effective one. An effective teacher can adjust teaching for students with different learning needs (Gündoğdu, 2016). In the teacher training programs in Turkey, there are two courses related to inclusion, namely "Special Education" and "Inclusion". Some courses are compulsory in the "Special Education" undergraduate programs, but they had removed from the program in some time. Inclusion course may be compulsory, optional or absent for different programs. With these courses, pre-service teachers are given general information about children with special needs; however, any special education techniques and strategies that can be used in inclusion practices cannot be included. It is important to carry out course plans, activities and courses in undergraduate programs which cover inclusion students. From this point of view, it is thought that applying a slightly modified form of differentiated education to science activities will be beneficial for primary school students to acquire more awareness. In this study, the concept of inclusion is emphasized in terms of individual difference and it is aimed to make the pre-service teachers aware of this issue in their class. For this purpose, differentiated science activities were developed and conducted based on the individual differences.

4. Purpose of the Research

In this study, it is aimed to investigate the effects of differentiated science activities on pre-service primary teachers' sentiments, attitudes and concerns about inclusion education.

5. Research Questions

The main research question of this study was: "What is the effect of differentiated science experiments on pre-service primary teachers' sentiments, attitudes and concerns about inclusion education?" In this context, the research sought to answer the following sub-questions:

1) Is there a significant difference between the pre-test scores related the sentiments, attitudes and concerns of the experimental and control groups about inclusion education?
2) Is there a significant difference between the pre-test and post-test scores of the experimental group's sentiments, attitudes and concerns about inclusion education?
3) Is there a significant difference between the pre-test and post-test scores of the control group's sentiments, attitudes and concerns about inclusion education?

4) Is there a significant difference between the post-test scores of the sentiments, attitudes and concerns of the experimental and control groups about inclusion education?

6. Material and Methods

Quantitative research method was used in this research. In the method section of the research, the research design, sample, data collection tool, application and data analysis are stated.

6.1. Research Design

The randomized pretest-posttest control group design was used in the research (Fraenkel & Wallen, 2006). According to this design, two groups, one control group and one experimental group, are determined by random assignment from the subject group. Before the application, the values of the subjects in the groups about the dependent variable are measured; and then the experimental process whose effect is tested is applied to the experimental group. Finally, the same data collection tools are used for measuring the dependent variables of the subjects (Büyüköztürk, Kılıç Çakmak, Akgün, Karadeniz & Demirel, 2016).

6.2. Sample

The study group of the research consists of pre-service primary teachers' who are in the senior class of a public university in Istanbul in the fall semester of the 2017-2018 academic year and who have not received any education on inclusion education before. Pre-service primary teachers participated in the study on voluntarily. One experimental group and one control group were selected in the study. For selecting these groups, simple random sampling method was used. In this sampling method, groups are randomly selected by providing to each sampling unit the possibility of equal selection (Büyüköztürk et al., 2016). At the end, 53 pre-service primary teachers are selected to control group and 50 pre-service primary teachers are selected to experimental group. Descriptive data regarding the demographic characteristics of the study group are presented in Table 1.

Table 1: Demographic information of the sample

Variable	Group	Control (N=53)		Experiment (N=50)		Total	
		N	%	N	%	N	%
Sex	Male	12	22.6	10	20	22	21.4
	Female	41	77.4	40	80	81	78.6
Age	25 and below	27	50.9	25	50	52	50.5
	Between 26-35	26	49.1	25	50	51	49.5

Table 1 shows that 78.6% (N = 81) of the pre-service primary teachers are female and 21.4% (N = 22) are male. 50.5% of the pre-service primary teachers are 25 years old and below, while 49.5% are between 26-35 years old.

6.3. Data Collection Tool

As a data collection tool, Sentiments, Attitudes and Concerns about Inclusive Education Scale (SACIE) developed by Forlin, Earle, Loreman and Sharma (2011) and adapted to the Turkish by Bayar, Özaşkın and Bardak (2015). The validity and reliability studies of the scale are completed. The scale is consisted of 15 items with three factors: "Sentiments about Inclusive Education", "Attitudes about Inclusive Education" and "Concerns about Inclusive Education". Cronbach Alpha internal consistency coefficient of the scale is 0.88, and it is 0.86 for the first dimension, 0.88 for the second dimension and 0.85 for the third dimension. Cronbach Alpha coefficients of the measuring instruments used in the researches should be at least 0.70 for a sufficient reliability level (Sipahi, Yurtkoru & Çinko, 2008; Tezbaşaran, 1996). The Cronbach Alpha internal consistency coefficient calculated for the whole scale and its sub-dimensions is greater than 0.70, so the reliability level is sufficient.

6.4. Implementation Process

Stage 1: Forming Experimental and Control Groups

In this research, one experimental group and one control group were selected by using simple random sampling method. The experimental group is constituted by 50 pre-service primary teachers while the control group is 53 pre-service primary teachers. The pre-service primary teachers are attending the second grade in Primary Education Department of a state university in Istanbul constitute the experimental group. In the equalization of the experimental and control groups, pre-test results were taken into consideration.

Stage 2: Pre-test Applications

At the beginning of the fall semester of the 2017-2018 academic year, a brief information was given about the course process and the scale, and then the pre-test was applied by asking the control and experimental groups to fill the "SACIE" scale simultaneously. Data were obtained by using the Sentiments, Attitudes and Concerns Scale about Inclusive Education (SACIE).

Stage 3: Teaching Process in Practice

Science Laboratory Applications course is a 1 hour theoretical and 2 hours practical course in IV. semester of Classroom Teaching Program. The course consists of brief laboratory experiments (planning the experiments, conducting them and evaluation of experimental results) and group work.

In the experimental group, inclusion education was mentioned superficially as an issue related to individual differences at the beginning of the academic year. Pre-service

primary teachers were asked to watch a film about students with special needs in order to build empathy and raise awareness about inclusive education. In addition, for only one time, one of the pre-service primary teachers was asked to close her eyes during the lesson and the class was taught without her participation. Then the student opened her eyes and asked what she felt and whether she understood the conducted experiment. Then, the eyes of the same student were closed again, but this time, the student take part in the experiment by having materials in front of her and asked again her feelings and whether she understood the experiment. A discussion environment in the classroom followed that. The differentiated science experiments were carried out by the instructor of the course by taking into consideration the individual differences until the midterm exams. Then the pre-service primary teachers in the experimental group were divided into groups and they were asked to prepare and present the experiments (on the subjects determined by the instructor) in accordance with the differences of the students who could take part in their classes. The students in the experimental group carried out experiments designed appropriate to the individual differences in the classroom environment. After the midterm exams, this process continued until the final exams. The pre-service primary teachers in the control group were taught based on the current program.

Stage 4: Post-test Applications

Within the scope of post-test applications, the data were obtained with "SACIE" scale. This data was obtained from both the experimental and the control groups.

6.5. Data Analysis

A paired-samples t-test was used for analysis of the data. In the research, statistical significance level was accepted as 0.05. Total scores of all items in the scale and the sub-dimensions were calculated. Since the five items of the emotion factor were negative, the scoring was reversed. The scores that can be obtained from the scale are ranked between 15 and 60. Rising scores indicate that the individual has a high level of sentiments, attitudes and concerns about inclusion education.

In the analysis of the scale data, Kolmogorov-Smirnov and Shapiro-Wilk tests were used to test whether the scores obtained show a normal distribution. The normality distribution test results of the scale are presented in Table 2.

Table 2: The normality distribution test results of the SACIE

Scale	Group		Kolmogorov-Smirnov			Shapiro-Wilk		
			Statistics	df	p	Statistics	df	p
SACIE	Experiment	Pre-test	0.108	50	0.200*	0.971	50	0.261
		Post-test	0.145	50	0.010	0.968	50	0.187
	Control	Pre-test	0.099	53	0.200*	0.953	53	0.038
		Post-test	0.116	53	0.075*	0.971	53	0.227

* p> .05

If the group size is greater than 50, the Kolmogorov-Smirnov test is used to determine the normality of the scores. If the calculated p-value is greater than 0.05, it indicates that the scores show normal distribution (Büyüköztürk, 2015). When Büyüköztürk's references were taken into consideration and the results of the normality test in Table 2 were examined, it was seen that the SACIE pre-test scores of both groups and the SACIE post-test scores of the control group showed a normal distribution (p> .05). The skewness and kurtosis coefficients were examined in order to confirm whether the SACIE post-test scores of the experimental group showed normal distribution. According to George and Mallery (2003), the data sets in which skewness-kurtosis coefficients are within ± 2 range show normal distribution. Since the skewness and kurtosis coefficients of the SACIE pre-test and post-test scores of the experimental and control groups were within ± 2 range, we can say that the data sets showed normal distribution.

7. Results

7.1. Findings for the First Sub-question: Is there a significant difference between the pre-test scores the experimental and control groups about inclusion education?

In the study, SACIE was applied to the experimental and the control group for the first sub-problem that stated as that "Is there a significant difference between the pre-test scores of the sentiments, attitudes and concerns of the experimental and control groups about inclusion education?" Before the application, independent samples t-test was conducted in order to see whether pre-test scores of pre-service primary teachers' sentiments, attitudes and concerns about inclusion education differ according to the experimental and control groups and the results are presented in Table 3.

Table 3: Independent samples t-test results for pre-tests of groups

Scale	Dimensions	Group	N	$\overline{X}$	sd	t	df	p
SACIE Pre-test	Sentiment	Control	53	14.07	2.03	.773	101	.441
		Experiment	50	13.74	2.36			
	Attitude	Control	53	13.28	2.93	-.666	101	.507
		Experiment	50	13.62	2.09			
	Concern	Control	53	12.66	2.51	-2.017	101	.046
		Experiment	50	13.58	2.08			
	Total	Control	53	40.01	3.81	-1.313	101	.179
		Experiment	50	40.94	3.01			

* p< .05

When Table 3 was examined, it was seen that the mean SACIE scores of pre-service primary teachers in the experimental and the control groups were very close to each other and did not show significant differences before the application [$t_{(101)} = -1.313$, p .05]. This finding shows that the sentiments, attitudes and concerns about the inclusion education of the experimental and control groups were equal before the application.

7.2. Findings for the Second Sub-question: Is there a significant difference between the pre-test scores of the experimental group about inclusion education?

In the study, for the second sub-problem that stated as that "Is there a significant difference between the pre-test scores of the sentiments, attitudes and concerns of the experimental group about inclusion education?" paired t-test is applied to the experimental group in order to see whether their pre-test and post-test scores are differed significantly. The findings are presented in Table 4.

Table 4: Pre-test and post-test findings of the experimental group

Scale	Group	N	$\overline{X}$	sd	t	df	p
Sentiment	Pre-test	50	13.74	2.36	-5.400	49	.000*
	Post-test	50	15.66	2.20			
Attitude	Pre-test	50	13.62	2.09	-5.356	49	.000*
	Post-test	50	16.04	2.90			
Concern	Pre-test	50	13.58	2.08	6.350	49	.000*
	Post-test	50	11.18	2.64			
Total	Pre-test	50	40.94	3.01	-3.288	49	.002*
	Post-test	50	42.88	3.65			

* p< .05

Table 4 indicates that the mean score obtained from the SACIE applied to the experimental group increased from 40.94 points before the study to 42.88 points after the study. It is seen that the mean scores of the experimental group which designing differentiated science experiments showed a significant difference in favor of the post-test both in the scale as a whole and in all dimensions of the scale (p< .05).

7.3. Findings for the Third Sub-question: The pre-test and post-test scores of the control groups about inclusion education?

In the study, paired sample t-test was applied to the experimental group for the third sub-problem that stated as that "Is there a significant difference between the pre-test and post-test scores of the control group's sentiments, attitudes and concerns about inclusion education?", and the results are presented in Table 5.

Table 5: Control group's sentiments, attitudes and concerns related to inclusion education differ based on pretest and posttest findings

Scale	Group	N	$\overline{X}$	sd	t	df	p
Sentiment	Pre-test	53	14.07	2.03	-1.612	52	.113
	Post-test	53	14.58	2.21			
Attitude	Pre-test	53	13.28	2.93	-.118	52	.907
	Post-test	53	13.32	2.91			
Concern	Pre-test	53	12.66	2.51	-.141	52	.888
	Post-test	53	12.71	2.60			
Total	Pre-test	53	40.01	3.81	-1.134	52	.262
	Post-test	53	40.62	3.98			

* p< .05

`Table 5 indicates that, the mean total score obtained from the SACIE applied to the control group before the study was 40.01. This score increased to 40.62 points after the research. However, it was seen that the mean scores of the control group did not show a significant difference both in the scale as a whole and in all dimensions of the scale (p> .05).

7.4. Findings for the Fourth Sub-question: Is there a significant difference between the pre-test scores of the experimental and control groups about inclusion education?

In the study, paired sample t-test was applied for seeing whether the SACIE post-test scores of the experimental and the control groups for the fourth sub-problem that stated as that "Is there a significant difference between the pre-test scores of the sentiments, attitudes and concerns of the experimental and control groups about inclusion education?" The results are presented in Table 6.

Table 6: Independent samples t-test results for group post-tests

Scale	Dimensions	Group	N	$\overline{X}$	sd	t	df	p
SACIE Post-test	Sentiment	Control	53	14.58	2.21	-2.471	101	.015*
		Experiment	50	15.66	2.20			
	Attitude	Control	53	13.32	2.91	-4.739	101	.000*
		Experiment	50	16.04	2.90			
	Concern	Control	53	12.71	2.60	2.970	101	.004*
		Experiment	50	11.18	2.64			
	Total	Control	53	40.62	3.98	-2.991	101	.003*
		Experiment	50	42.88	3.65			

* p< .05

Table 6 indicates that the SACIE mean scores of the pre-service primary teachers in the experimental and control groups showed a significant difference after the application [$t_{(101)}$ = -2.991, p< .05]. In addition, a significant difference was found in favor of the experimental group in the sentiments, attitudes and concerns sub-dimensions of the scale.

8. Discussion, Conclusion and Suggestions

In this study, it is aimed to examine the effect of using differentiated activities in science lessons as an example of instructional adaptations on sentiments, attitudes and concerns about inclusion education in science education teacher training.

In the research, it was determined that pre-service primary teachers' sentiments, attitudes and concerns about inclusion education were similar. After the application, it was concluded that the pre-service primary teachers' sentiments, attitudes and concerns about inclusion education changed significantly. It was interpreted that the differentiated science experiments positively changed the pre-service primary teachers' sentiments and attitudes about inclusion education. In addition, it was seen that the pre-service primary

teachers' concerns about inclusion education decreased after the application. This finding revealed that differentiated science experiments reduced pre-service primary teachers' concerns about inclusion education. This result of the research is in parallel with many researches in which show that inclusion education practices affect the attitudes of teacher candidates (Alsheikh & Elhoweris, 2006; Altıntaş & Şengül, 2014; Balçın, Coştu, & Mertoğlu, 2019; Bek, Gülveren & Baser, 2009; Gözün & Yıkmış, 2004; Mertoğlu, Taymaz Sarı, Pusmaz, & Balçın, 2020; Orel, Töret & Zerey, 2004). In these studies, in the literature, it is noted that the attitudes of pre-service primary teachers who have received inclusion education have changed positively.

This result that there is a significant difference between the experimental and control groups in the favor of the experimental group after the implementation process can be associated with other studies investigating the relationship between inclusion education and self-efficacy perceptions in the literature. For example, in a study conducted by Dolapci (2013), a significant relationship was drawn between pre-service teachers' self-efficacy perceptions and their efficacy on inclusion education. It is stated that as self-efficacy perceptions of pre-service teachers increase, their competences regarding inclusion education increase. The researcher draws attention to the relationship between self-efficacy perceptions of teachers and the instruction they receive about special education and states that the teachers' perceptions of competence or self-confidence about their work with students who need special education is a factor that can affect the success of special education. In a similar study conducted by Toy (2015), it is investigated whether classroom teachers' self-efficacy beliefs and efficacy beliefs about inclusion education differ according to certain variables. The result of the research indicates that as teachers' self-efficacy beliefs increased, their efficacy beliefs about inclusive education increased.

In addition, this research is similar to the results obtained from other studies (Mertoğlu, Taymaz Sarı, Pusmaz, & Balçın, 2020; Balçın, Coştu, & Mertoğlu, 2019) that investigate the relation between sentiments, attitudes and concerns of pre-service teachers about inclusion education and teacher efficacy. Mertoğlu, Taymaz Sarı, Pusmaz, & Balçın (2020) stated that there is a positive change in the teacher efficacy scores of the pre-service teachers who received training for inclusive education compared to non-trained pre-service teachers. In a study conducted by Balçın, Coştu, & Mertoğlu (2019), it is found that inclusion education given to pre-service teachers in different branches increased their attitudes and feelings towards inclusion practices and decreased their concerns about them. In addition, it is stated that it has a positive effect on the teacher efficacies of the pre-service teachers about inclusion practices.

According to Bandura (1994), physiological and psychological factors such as stress, fear and anxiety are positive and negative factors that affect people's belief in doing a job. Self-efficacy beliefs affect individuals' thoughts, motivations, emotions and choices. Based on the results obtained from the above researches, it is thought that reducing the pre-service teachers' concerns about the subject can contribute to both their sentiments and attitudes towards inclusion education and their efficacies. The positive

change in the sentiments, attitudes and concerns of the students in the experimental group in which differentiated education is applied in the research is similar to some other studies in the literature. Researchers (Demir, 2013; Erdoğan & Kahveci, 2015; Mastropieri, Scruggs, Norland, Berkeley, McDuffie, Tornquist & Connors, 2006; Şahin, Keser, 2016) state that differentiated teaching has positive effects on students. Mastropieri, Scruggs, Norland, Berkeley, McDuffie, Tornquist and Connors (2006) conducted a study of classroom-wide peer education in the 8th grade science classes using differentiated hands-on activities and teacher-directed instruction for students with mild disabilities. The results of the study show statistically that collaborative practical activities facilitate the learning of secondary school science content for all students and that students enjoy using the activities.

Erdoğan and Kahveci (2015) investigated the effectiveness of a differentiated Science and Technology program that will meet the learning needs of gifted and talented students on students' attitudes towards Science and Technology course. In the study, it is stated that the differentiated program significantly increases students' attitudes towards Science and Technology course, and there is a statistically significant difference between the pre-test and post-test results of the male students in the experimental group. In a study conducted by Demir (2013), the effect of differentiated teaching methods on students' academic achievement, learning approaches and retention scores was investigated. It is stated that the use of differentiated teaching methods contributes positively to the students' access, active participation in the learning process, increasing their interest towards the course and their motivation. Demirkaya (2018) investigated the perceptions of classroom teachers on their own perception levels of efficacy about differentiated teaching. It is stated that the perception of classroom teachers towards differentiated teaching is generally high except for getting to know the student and providing activities and materials in line with the individual needs of the students. Informing the pre-service primary teachers about the activities and materials for students with special needs may be come up with the field courses they will take in the undergraduate period in terms of inclusion education. As a matter of fact, this study shows that differentiated science experiments reduce pre-service primary teachers' concerns about inclusion education.

With differentiated instructional design, all students have the opportunity to carry out meaningful studies on the subject suitable to their own qualifications and different characteristics. Thus, it enables students to go one step further (Tomlinson, 2001; Yabaş & Altun 2009). As Kurt and Ekici (2013) stated, it should not be forgotten that today's education system and teachers can achieve equal opportunities and success in education to the extent that individual learning features of their students can be revealed and instructional activities will be prepared accordingly. Therefore, as in this study, differentiated teaching in science education with students in the future will serve to inclusion education when they become teachers.

This research was carried out in the science laboratory in the department of primary school teaching. It is suggested that similar studies should be conducted in other

fields in education faculties. In order to improve the attitudes of pre-service primary teachers about inclusion, inclusion education should be linked to the related courses. In other words, providing inclusion education not only in special education and inclusion courses but also in the field courses can help to reduce pre-service primary teacher's concerns as this study shows.

While the teacher education programs in Turkey have "Special Education" and "inclusion" lessons, any inclusion lesson associated with field courses is absent. However, not only special education faculty members, but also field teachers also refer to and exemplify inclusion in field courses is important for effective implementation of inclusion education. As a matter of fact, in this study, it was found that differentiated science experiments in science laboratory, which is a field course in science education, were effective on both the sentiments, attitudes, concerns and teacher efficacies of pre- pre-service primary teachers. Therefore, it is recommended that inclusion education should be focused not only on special education but also on field courses.

Today, the world is moving from inclusion education to integration. In this way, in addition to a number of educational regulations for individuals with special needs of the Ministry of National Education in Turkey, YÖK [Council of Higher Education] has made some changes in the teacher education undergraduate programs in recent years. The most striking one of these changes is that now the course "*individualizing and adapting teaching*" takes place in all fields of the faculty of education. In accordance with the new program, pre-service teachers are required to make adjustments, differentiations, individualizations in the teaching and adapt them to the students with special needs considering the individual differences. In this context, this study shows that differentiated science experiments carried out in science laboratories as an example of the adaptations will contribute to the studies on inclusion in science teachers.

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